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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,629	10/23/2003	Byoung-Hoon Kim	GCTS-0036	5927

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EXAMINER	
BENGHUZZI, MOHSIN M	
ART UNIT	**PAPER NUMBER**
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/690,629	KIM ET AL.	
	Examiner	Art Unit	
	Mohsin (Ben) Benghuzzi M.B.	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *23 October 2003*; 25 May, 2004
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because of the following:

   a) Figure 10 of the substitute drawings (page 11/11) is not included in the disclosure.

   b) Reference numbers '3_2' '3_3' and '3_4' on page 7 of the specification differ from corresponding ones in Fig. 1a.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 17 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The subject matter 'energy bias canceler' contained in said claims was not adequately described in the specification.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmidt et al. (US Pub 2003/0161421) in view of Allpress et al. (US Pub 2002/0131488).

1) Regarding claim 1:

Schmidt et al. teaches a method for reducing signal distortion in a receiver, comprising:

deriving a sequence of chips from a received signal (paragraph 0032 lines 1-5 and paragraph 0033 lines 1-7);

canceling postcursor-ISI from the chip sequence to produce a chip metric (paragraph 0013 lines 6-8);

determining a current CCK codeword based on said chip metric (paragraph 0040 lines 1-4).

Schmidt et al. does not teach:

computing a chip-time reversed estimate of the current CCK codeword; and

canceling precursor-ISI from a previous CCK codeword based on the chip-time reversed estimate of the current CCK codeword.

However, Allpress et al. teaches:

computing a chip-time reversed estimate of the current CCK codeword (paragraph 0009 lines 6-12); and

canceling precursor-ISI from a previous CCK codeword based on the chip-time reversed estimate of the current CCK codeword (paragraph 0009 lines 6-12 and paragraphs 0007, 0008).

It is advantageous that the chip-time reversed estimate of a current CCK codeword is computed and used by an equalizer to cancel a precursor-ISI from a previous CCK codeword. This results in the channel seen by the equalizer having minimum phase distortion (see Allpress et al., paragraph 0009 lines 13-14). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention

was made to include computing the chip-time reversed estimate of a current CCK codeword, as Allpress et al. teaches, in the method of Schmidt et al., in order to result in minimized channel phase distortion effects.

2) Regarding claim 2:

Schmidt et al. teaches the method of claim 1, wherein deriving the chip sequence includes:

convolving the received signal with coefficients of a channel matched filter (paragraph 0025 lines 1-6 and paragraph 0037 lines 2-5).

3) Regarding claim 3:

Schmidt et al. teaches the method of claim 1, further comprising:

generating terms for canceling the postcursor ISI from a chip sequence detected in a preceding symbol (paragraph 0013 lines 6-8 and paragraph 0025 lines 1-6, wherein, 'coefficients' are interpreted to be those for the cancellation terms).

4) Regarding claim 4:

Schmidt et al. teaches the method of claim 1, wherein canceling postcursor-ISI includes:

generating postcursor-ISI cancellation terms from a previously detected CCK chip sequence used to form a previous CCK codeword (paragraph 0013 lines 6-8 and paragraph 0025 lines 1-6, wherein, 'coefficients' are interpreted to be those for the cancellation terms).

Regarding, subtracting the postcursor-ISI cancellation terms from the chip sequence to produce said chip metric. Allpress et al. teaches, subtracting the

postcursor-ISI cancellation terms from the chip sequence to produce said chip metric (paragraph 0033 lines 13-15). It is clearly desirable that postcursor-ISI cancellation terms are cancelled from a received chip sequence. Subtraction of such terms will result in reduction in interference. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to subtract the postcursor-ISI cancellation terms, as Allpress et al. teaches, from the chip sequence of Schmidt et al., in order to result in reduced interference.

5) Regarding claim 5:

Schmidt et al. teaches the method of claim 1, wherein canceling postcursor-ISI includes:

setting DFE coefficients based on a previously detected CCK chip sequence (paragraph 0025 lines 1-6, paragraph 0037 lines 2-5, and paragraph 0040 lines 1-4).

Furthermore, Allpress et al. teaches:

generating postcursor-ISI terms by shifting the DFE coefficients a predetermined number of times per chip clock (paragraph 0009 lines 6-12 and paragraph 0011 lines 7-14, wherein, 'time-reversed' is interpreted as shifting terms);

subtracting the postcursor-ISI terms from the chip sequence to produce said chip metric (paragraph 0033 lines 13-15).

6) Regarding claim 6:

Schmidt et al. teaches the method of claim 1, wherein the current CCK codeword is generated by inputting said chip metric into a CCK correlator (paragraph 0024 lines 1-

7 and page 5, claim 37 line 3-5, wherein, the matched filter is clearly interpreted to perform the correlation).

7) Regarding claim 7:

Allpress et al. teaches, wherein canceling the precursor-ISI includes:

computing conjugates of chip values of a future symbol (paragraph 0009 lines 6-12, wherein, it is clearly interpreted that computing time-reversed estimate of a channel must include computing the conjugate of chips);

setting DFE coefficients based on the conjugates (paragraph 0009 lines 6-12 and paragraph 0011 lines 7-14, wherein, it is clearly interpreted that computing time-reversed estimate of a channel must include computing the conjugate of chips);

generating precursor-ISI terms by shifting the DFE coefficients a predetermined number of times per chip clock (paragraph 0009 lines 6-12 and paragraph 0011 lines 7-14, wherein, 'time-reversed' is interpreted as shifting terms); and

subtracting the precursor-ISI terms from chip metrics corresponding to the previous CCK codeword (paragraph 0033 lines 13-15).

8) Regarding claim 8:

Schmidt et al. teaches the method of claim 1, wherein the received signal is one generated in a DSSS/CCK wireless communications system (paragraph 0006 lines 6-9).

9) Regarding claim 9:

Schmidt et al. teaches the method of claim 1, further comprising:

equalizing signal energy in a codeword correlator bank used to generate the current and previous CCK codewords (paragraph 0024 lines 1-7 and page 5, claim 37 line 3-5, wherein, the matched filter is clearly interpreted to perform the correlation).

10)Regarding claim 10:

Schmidt et al. teaches the method of claim 1, further comprising:

(a) obtaining chips of the previous CCK codeword generated after cancellation of the precursor-ISI (paragraph 0013 lines 4-8); and

(b) performing postcursor-ISI and precursor-ISI based on the previous CCK codeword chips obtained in (a) (paragraph 0013 lines 4-8).

11)Regarding claim 11:

Schmidt et al. teaches the method of claim 10, further comprising: repeating steps (a) and (b) a predetermined number of times (Fig. 4, wherein, 'RETURN' is interpreted as steps are repeated).

12)Regarding claim 12:

Schmidt et al. discloses a system for reducing signal distortion in a receiver, comprising:

channel matched filter which generates a sequence of chips from a received signal (paragraph 0032 lines 1-5, paragraph 0033 lines 1-7, paragraph 0025 lines 1-6, and paragraph 0037 lines 2-5);

a decision feedback equalizer (DFE) which cancels postcursor-ISI from the chip sequence to produce a chip metric (paragraph 0013 lines 6-8); and

a CCK correlation-decision block which generates a current CCK codeword based on said chip metric (paragraph 0024 lines 1-7 and page 5, claim 37 line 3-5, wherein, the matched filter is clearly interpreted to perform the correlation).

Regarding, wherein the DFE cancels precursor-ISI from a previous CCK codeword based on a chip-time reversed estimate of the current CCK codeword, as discussed in claim 1 above, Allpress et al. discloses, wherein the DFE cancels precursor-ISI from a previous CCK codeword based on a chip-time reversed estimate of the current CCK codeword (paragraph 0009 lines 6-12 and paragraphs 0007, 0008).

13)Regarding claim 13:

Schmidt et al. discloses, wherein the DFE cancels postcursor-ISI by generating postcursor-ISI correction terms from a previously detected CCK chip sequence used to form the previous CCK codeword (paragraph 0013 lines 6-8 and paragraph 0025 lines 1-6, wherein, 'coefficients' are interpreted to be those for the cancellation terms).

Regarding, and subtracting the postcursor-ISI correction terms from the chip sequence to produce said chip metric, as discussed in claim 4 above, Allpress et al. discloses, subtracting the postcursor-ISI correction terms from the chip sequence to produce said chip metric (paragraph 0033 lines 13-15).

14)Regarding claim 14:

Schmidt et al. discloses, wherein the DFE cancels postcursor-ISI by setting DFE coefficients based on a previously detected CCK chip sequence (paragraph 0025 lines 1-6, paragraph 0037 lines 2-5, and paragraph 0040 lines 1-4).

As discussed in claim 5 above, Allpress et al. discloses, generating postcursor-ISI terms by shifting the DFE coefficients a predetermined number of times per chip clock (paragraph 0009 lines 6-12 and paragraph 0011 lines 7-14, wherein, 'time-reversed' is interpreted as shifting terms), and subtracting the postcursor-ISI terms from the chip sequence to produce said chip metric to produce said chip (paragraph 0033 lines 13-15).

15)Regarding claim 15:

Allpress et al. discloses, wherein the DFE cancels the precursor-ISI by computing conjugates of chip values of a future symbol (paragraph 0009 lines 6-12, wherein, it is clearly interpreted that computing time-reversed estimate of a channel must include computing the conjugate of chips), setting DFE coefficients based on the conjugates (paragraph 0009 lines 6-12 and paragraph 0011 lines 7-14, wherein, it is clearly interpreted that computing time-reversed estimate of a channel must include computing the conjugate of chips), generating precursor-ISI terms by shifting the DFE coefficients a predetermined number of times per chip clock (paragraph 0009 lines 6-12 and paragraph 0011 lines 7-14, wherein, 'time-reversed' is interpreted as shifting terms), and subtracting the precursor-ISI terms from chip metrics corresponding to the previous CCK codeword (paragraph 0033 lines 13-15).

16)Regarding claim 16:

Schmidt et al. discloses the system of claim 12, wherein the receiver is a DSSS/CCK wireless communications receiver (paragraph 0006 lines 6-9).

17)Regarding claim 17: (claim as interpreted by examiner)

Allpress et al. discloses, an energy bias canceler which equalizes signal energy in the codeword correlator bank (paragraph 0040 lines 15-23 and paragraph 0043).

18)Regarding claim 18:

Schmidt et al. discloses a bidirectional turbo ISI canceler (BTIC), comprising:

a single-symbol detector which generates a sequence of chips from a received signal (paragraph 0032 lines 1-5 and paragraph 0033 lines 1-7);

a postcursor-ISI canceler which cancels postcursor-ISI from the chip sequence to produce a chip metric (paragraph 0013 lines 6-8).

As discussed in claim 1 above, Allpress et al. discloses, a precursor-ISI canceler which cancels precursor-ISI based on a chip-time reversed estimate of a current CCK codeword generated from said chip metric (paragraph 0009 lines 6-12 and paragraphs 0007, 0008).

19)Regarding claim 19:

Schmidt et al. does not specifically disclose, wherein the single-symbol detector includes a RAKE receiver, however, however, it is well known in art that a RAKE receiver is desirable since it offers superior ISI interference suppression. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a RAKE receiver in the bidirectional turbo ISI canceler of Schmidt et al. in order to result in superior ISI interference suppression.

20)Regarding claim 20:

Schmidt et al. the bidirectional turbo ISI canceler of claim 18, wherein the single-symbol detector includes:

a channel matched filter which generates the chip sequence from the received signal (paragraph 0025 lines 1-6 and paragraph 0037 lines 2-5); and

a codeword correlator bank which generates the current CCK codeword from said chip metric (paragraph 0024 lines 1-7 and page 5, claim 37 line 3-5, wherein, the matched filter is clearly interpreted to perform the correlation).

21)Regarding claim 21: (claim as interpreted by examiner)

Allpress et al. discloses, wherein the single-symbol detector further includes an energy bias canceler to equalize signal energy in the codeword correlator bank (paragraph 0040 lines 15-23 and paragraph 0043).

22)Regarding claim 22:

Schmidt et al. teaches a method for reducing distortion in a receiver, comprising:

computing a set of DFE coefficients (paragraph 0025 lines 1-6, and paragraph 0040 lines 1-4);

canceling postcursor-ISI caused by a preceding symbol using the set of DFE coefficients (paragraph 0013 lines 6-8, paragraph 0025 lines 1-6, and paragraph 0040 lines 1-4).

Furthermore, as discussed in claims 1 and 7 above, Allpress et al. teaches, canceling precursor-ISI caused by a trailing symbol using the same set of DFE

coefficients (paragraph 0009 lines 6-12, paragraphs 0007 and 0008, and paragraph 0011 lines 7-14).

23)Regarding claim 23:

Schmidt et al. discloses a receiver, comprising:

a first canceler which cancels postcursor-ISI caused by a preceding symbol (paragraph 0013 lines 6-8);

a second canceler which cancels precursor-ISI caused by a trailing symbol (paragraph 0013 lines 4-6), wherein the first and second cancellers use a set of DFE coefficients to cancel the postcursor-ISI and precursor-ISI (paragraph 0025 lines 1-6, and paragraph 0040 lines 1-4).

Regarding the set of DFE coefficients being the same, as discussed in claims 1 and 7 above, Allpress et al. discloses, the first and second cancellers use a same set of DFE coefficients to cancel the postcursor-ISI and precursor-ISI (paragraph 0009 lines 6-12, paragraphs 0007 and 0008, and paragraph 0011 lines 7-14)

24)Regarding claim 24:

Schmidt et al. discloses the receiver of claim 23, wherein the first and second cancellers are included in a same DFE (paragraph 0011 lines 3-9).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Andren et al. (US 6,678,310) discloses a demodulator for a spread spectrum radio transceiver that includes a feed forward and a feedback filter.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohsin (Ben) Benghuzzi whose telephone number is (571) 270-1075. The examiner can normally be reached Monday through Friday, 8:30am- 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

8. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mohsin (Ben) Benghuzzi February 10, 2007

M. G

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER